

Interface

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Like many third-shift people at Cray Research, Marie Krager comes to work at 11:00 p.m. The more than 120 people who work this shift will make it possible for Cray Research to produce forty machines in 1986.

Big contributions in the wee hours

During the dark hours of third shift, the hallways seem longer, and footsteps echo in deserted corridors. The smell of freshly waxed floors is stronger — even fluorescent lights appear brighter as they glow in contrast to darkened offices.

In the Riverside Printed Circuit Board Facility, Production Supervisor Jeff Galde enjoys the

third-shift atmosphere. "I'm a night owl," he explains. "I enjoy the peacefulness of this shift. I like to be awake at this time of day — or should I say night?"

"Working third shift, I have my days to run errands, enjoy personal hobbies, and catch up on sleep. My evenings and weekends are devoted to my wife and sixteen-year-old son. Overall,

the quality of my private time is really improved."

"Besides," Jeff adds, "when I work third shift, I don't compete with the majority of the population for prime-time recreational hours. I can tee off anytime I want, fish in any hole, and put out my boat without waiting in line. For me, that is well worth a less-than-normal schedule."

Although having the daylight hours free may sound fantastic, achieving harmony with third-shift hours isn't always easy. For most newcomers, there is a tough period of adjustment. "I trained on days with a group of new people for six weeks," tells Arlene Lissack, IC process technician. "When we started on third shift our main topic of conversation was sleep: How much did you get? How little did you get? Did you catch up?"

Chronobiologists, scientists who study cyclical rhythms, know that working odd hours can affect many changes. Their research shows that body clocks operate on a circadian (24-hour) cycle. During this cycle, your body temperature changes, causing varying periods of productivity. These variations are accountable for what we call morning or night people. Body temperature peaks early in the day for a morning person and in the evening for a night person. As research studies progress, scientists are searching for ways to help the body deal with the "jet lag" associated with shift change. Time and again, the answer points to the importance of establishing and maintaining a strict schedule. Consistent routines in diet, exercise, and sleep patterns are very important.

"It gets easier every day," Arlene continues. "I didn't have a special secret — I just turned



During third shift, fluorescent lights appear brighter, glowing in sharp contrast to the dark corners of manufacturing areas that have closed down for the night.

my entire schedule around — and stuck to it. My time card says midnight to 8:30 a.m., and that's when I do my job."

One of the reasons Roseanne Schneider, modules production supervisor, likes the third shift is because it allows her to spend more time with her seven-year-old daughter. "I sleep while she's in school," Roseanne explains. "Then we have our afternoons and evenings together. It's very important to me that we spend time together, and third shift allows that flexibility."

Changing diet, exercise, and sleep patterns are obvious adjustments made by third-shift workers. They do, however, have other factors to contend with on this off-hours schedule. Although they essentially are performing the same duties as first- and second-shift people, they work under different conditions. "It's a different ballgame," comments Kathy Sterling, wiring production supervisor. "For example, in manufacturing, the production people are the only ones around at night. When we have a production change, we leave notes. It's a matter of making the most of the resources we have on hand. It's a challenge, and I have to admit that we do a good job."

Marty DeMoe, first shift modules supervisor, recognizes the value of the third shift. "It's always rewarding to walk in here in the morning and see how much work has moved through the department overnight. Between Chippewa Falls and Rice Lake, over 120 people work third shift. Combining all three shifts, we are able to produce anywhere from 200 to 400 boards each day."

Often, the challenge of meeting production schedules creates a need for extra team effort from the people in manufacturing. Each manufacturing cycle consists of three eight-hour time periods, and overtime hours are



Third-shift Supervisors Maryanne Lambert and Kathy Sterling exchange information with Sue Himpel, second-shift supervisor. This exchange helps to build a smooth transition and effective communication around the clock.

not uncommon. The team effort in both Chippewa Falls and Rice Lake is outstanding: when there is a need, there is motivation and support.

"Third-shift people have a top-notch attitude when it comes to cooperating with and contributing to overtime hours," comments Maryanne Lambert, a wiring supervisor who has 74 people working with her on third shift. "Although each shift puts in its share, third-shift people really deserve recognition for their outstanding contributions. Many people stay over into the first shift, or come in early if it means getting the job done."

Non-stop production schedules and many overtime hours make progress in manufacturing clearly visible. In some areas, however, progress is measured more easily than in others. For example, in modules, where boards physically leave the facility every day, it's easy to count the numbers. Wiring, on the other hand, can take weeks to complete a chassis from start to finish — where second shift stops, third shift

begins. In PCB, over 30 people work third shift, and together with the two earlier shifts, they produce over 1000 printed circuit boards a day. Systems test contributes 25 people to third shift, working around the clock to test manufactured systems for performance and quality. And integrated circuits, with three people on third shift, continues the research and development effort by making the necessary prototype parts for systems currently under development.

To those who hate the sound of a 6:00 a.m. alarm, working the night shift might seem appealing: no more dark mornings, rush-hour traffic, or crowded stores. To people who actually work third shift, being able to spend more time with their families and enjoying quality personal time are other benefits. Whatever reason for burning the midnight oil, the efforts and accomplishments of third-shift people enable Cray Research to boast of progress, growth, and success.

Super software for our future

"Superior computational power" — these words have guided every division, department, and individual at Cray Research for more than a decade. Introduction of the UNICOS operating system in March supports this vision. Through planning, teamwork, and commitment, Cray's software teams attained a goal of great magnitude.

Planning ahead

Shortening product development cycles pose new challenges for software developers around the world. Cray's product history is a good example. The time period between introduction of the CRAY-1 and the CRAY X-MP computers was nearly six years. Between the CRAY X-MP and the CRAY-2 systems, that period was three years. By the end of the decade, that interval will shrink even more.

While the Cray Operating System (COS) demonstrates the superior power of Cray computers, it is closely tied to the CRAY-1 architecture. Providing a transportable operating system — one that moves easily from one product to

the next — was a primary concern.

"There were serious considerations for providing an operating system for our future products," recalls David Judd, who together with Gayle Smith co-chaired Cray's study group on future operating systems. "Our concern was whether we could satisfy the large application programs we saw coming on our future systems. We had a good idea of those requirements based on Seymour's involvement with the CYBER 6600, CYBER 7600, CRAY-1, and CRAY-2 systems."

The study group chose AT&T UNIX System V as a base for UNICOS because it was a well-designed, portable, interactive operating system adaptable to Cray's environment. One of the things that makes UNIX portable is the C language, which is a high-level language easily understood by users.

"Our options included adapting an already existing operating system, rewriting COS in a high-level language, or starting from scratch in a high-level language," notes Neill Haggard, member of the study group and part of the UNICOS team for the CRAY-2 system. "If we decided to convert COS to make it portable,

all software development efforts would be consumed by conversions rather than enhancements. While future enhancements are planned for both COS and UNICOS, we now are in a position to offer an operating system that can be supported across all of Cray's products."

UNICOS is comprised of a small kernel surrounded by a large set of utilities. Because of the modular design, users can make local enhancements by creating new UNICOS utilities, which may be written and tested without impacting the overall stability.

Teams and teamwork

In July 1983, the software development group for the CRAY-2 system, headed by Dave Judd, began porting a version of the AT&T UNIX System V to the CRAY-1/S computer — the first step in porting the system to the CRAY-2 mainframe. By September 1983, a demonstration system was running on the CRAY-1/S computer. Until a CRAY-2 system was available, the group used a CRAY-2 simulator on the CRAY-1/S system. By April 1985, a UNICOS prerelease version was running at a customer site.

"Simulators provided by Richard Gisselquist and Clay Andreasen were instrumental in shortening the software development time," notes Tim Hoel, member of the UNICOS team for the CRAY-2 mainframe. "These simulators provided a very productive environment."

The CRAY-2 computer and earlier Cray products differ in many ways, including address space, registers, memory size, and instruction sets. These differences require that variations of UNIX be adapted for each architecture.

In early 1984, a second software development group began to develop a transportable



Cray Research is preparing to install at least twelve systems running UNICOS before year-end. At the same time, software developers are adding even greater functionality to Cray's new operating system. Above: Clark Piepho (foreground), Jim Harrell, Jeff Pomeroy, and Larry Shermer.



Introduction of the UNICOS operating system in March supports Cray's vision for superior computational power. Above: Jim Kiernan and Clay Andreasen, members of the UNICOS team for the CRAY-2.

version of UNICOS for both CRAY X-MP and CRAY-1/S computers. This software development group, headed by Jim Miller, used as its base system the version of the operating system that had been ported to the CRAY-1/S system. By November 1985, a UNICOS prerelease version was running on a CRAY X-MP system at a customer site.

"The group working on UNICOS for the CRAY-2 system had a solid base, which helped us with our porting efforts," notes Jim Harrell of the CRAY X-MP system group. "We also were able to help them with their efforts because the first contract for a CRAY-2 system running UNICOS called for an interim CRAY X-MP system with UNICOS."

Compatibility and other commitments

Beginning from a common base, both software groups worked simultaneously to develop the UNICOS operating system for their targeted machines. As a result, UNICOS runs on the CRAY-2 computer and on CRAY X-MP or CRAY-1 systems

configured with an I/O Subsystem.

The important similarity between the UNICOS operating systems for the CRAY-1, CRAY X-MP, and CRAY-2 systems is the environment.

"Actually, we had three compatibility issues to consider," notes Jim Miller. "We needed compatibility with UNIX System V, compatibility between the CRAY-2, CRAY X-MP, and CRAY-1 systems, and compatibility with COS. Our commitment to UNICOS compatibility across all hardware includes having the same interface for user calls, system calls, library calls, and languages. Exceptions will occur due to architectural difference or to performance needs that are dependent on architectural differences."

Cray's commitment to customer satisfaction is evident from the migration efforts within the company. For current customers running COS, Cray Research is providing an environment and tools to aid in the migration. The Cray Fortran environment will be supported under both COS and UNICOS. Furthermore, CRAY X-MP multiprocessors will provide users with the capability to run both COS and UNICOS simultaneously in the same mainframe.

A migration committee, headed by Judy Braun, is addressing issues of migration aids, training, documentation, and field services. Members of this committee provide a central source for customers, site analysts, and internal users to support the migration from COS to UNICOS.

"The commands and utilities for UNICOS may seem awkward at first," notes Mark Furtney, part of the UNICOS team for the CRAY-2 system. "Once users pass the break-in period, UNICOS becomes second nature. At this point users can see how the tools fit their environment hand in glove."



Compatibility and performance were primary considerations for Jim Bravatto and Jim Miller, who worked on the UNICOS operating system for the CRAY X-MP and CRAY-1 systems.

Fast but not least

In line with Cray's mission for superior computational power, both UNICOS efforts focused on performance. Like any operating system, UNICOS requires a portion of available memory. Of the 256 million words available with the CRAY-2 system, the UNICOS kernel takes less than 100,000 words. "Our target was to achieve measurable performance that was greater than or equal to COS," notes Tim Hoel. To this, Jim Miller adds: "If an operating system doesn't offer performance and stability, it doesn't serve the needs of Cray Research or its customers." Together, the company is preparing to install at least twelve systems running UNICOS before year-end.

"Introduction of the UNICOS operating system is the culmination of the talent, hard work, and dedication of many people" notes Gayle Smith. "We have demonstrated that a UNIX based system can deliver the performance of Cray products. Software Development's next challenge is to provide the functionality of COS in the UNICOS system."



Ex-smoker Mary Bergeron "kicks the habit." For those that have tried to quit but failed, Mary recommends trying again.

Kick the habit

Statistics from the Federal Trade Commission show that Americans spend over \$23 billion on nearly 600 billion cigarettes every year. Accordingly, 350,000 Americans die prematurely each year from the effects of smoking. And every day, millions more live with crippled lungs and overstrained hearts.

Cigarette smoking is a major cause of emphysema, lung cancer, chronic bronchitis, and coronary heart disease. There is no controversy about the facts — thousands of careful studies have documented them, and no major medical or health agency questions them.

Cigarette smoke assaults delicate tissues in your mouth, throat, breathing tubes, and lungs. After the smoke passes

your mouth, your lungs retain from 70-90 percent of the compounds inhaled. There are thousands of chemical substances in cigarette smoke; three of the most damaging are nicotine, tars, and carbon monoxide.

Nicotine makes blood vessels constrict. It cuts down the flow of blood and oxygen through the body, forcing your heart to pump harder. Besides the tars that damage delicate lung tissues, the billions of tiny particles in cigarette smoke cool inside your lungs and form a brown, sticky mass that produces cancer in test animals. Carbon monoxide drives the oxygen out of red blood cells. The level of this gas in the blood of smokers is four times higher than nonsmokers — for heavy

smokers, sometimes 15 times higher. Carbon monoxide stays in the blood stream robbing the body of oxygen for as long as six hours after the person stops smoking.

More than 33 million American have quit smoking. Many more would like to, but just don't know how. At Cray Research, Mary Bergeron, production supervisor in Chippewa Falls, and Don Luger, senior software instructor in Mendota Heights, are good examples of successful quitters.

"Three years ago, on December fifth, I smoked my last cigarette," Mary remembers. "Through Cray Research, I joined a stop-smoking clinic at St. Joseph's Hospital. It was not easy; in fact, if I'm being totally honest, I have to admit

that it was the hardest thing I ever did in my life."

"You can't quit unless you really want to — it has to be a number-one priority. However, I feel good about myself, and I encourage anyone who has tried to quit, but failed, to try again. The temporary discomforts of quitting are well worth your health."

Don's approach was to go cold-turkey. "After I decided that I really wanted to do it, I just quit," he explains. "No cutting back, no drugs, no hypnosis — I just decided that I was going to do it. It's tough, but it can be done."

Once you decide that you want to quit, you'll find the method that is right for you. You can quit "cold turkey" or set a date two weeks ahead. You can record how many cigarettes you smoke and when; then you can try to smoke half as many. You can make a pact to quit with a friend. You can go to a withdrawal clinic.

The important thing to realize is the minute you do stop smoking, your body will go to work repairing some of the damage cigarettes have inflicted. Take care of your lungs. As the American Lung Association reminds us, "They're only human."



Note: The statistics in the article were obtained with help from the American Lung Association.

If you want to "kick the habit," here are some suggestions that may help:

- Get involved with an active exercise program.
- Smoke a different brand of cigarettes.
- Make a list of rooms or places where you smoke and eliminate one area for smoking every week.
- Put a rubber band around your pack of cigarettes that you have to remove every time you light up.
- Place your pack in another room so you have to get up each time you want to have a cigarette.
- Eat a low calorie snack like celery or carrots when you get the urge to smoke.
- Drink liquids when you have the desire to smoke, but avoid coffee and alcohol.
- Take a deep breath, hold it for 10 seconds and release it slowly when you get the urge to smoke.
- Try the buddy system — ask a friend to quit with you.

The facts for nonsmokers:

- Inhaling second-hand smoke makes the heart beat faster, causes the blood pressure to go up, and increases the level of carbon monoxide in the blood.
- There is more cadmium in the smoke that drifts off the burning end of the cigarette than in the drag the smoker takes. Large doses of cadmium have been related to hypertension, chronic bronchitis, and emphysema.
- Smoke from an idling cigarette contains more tar and nicotine than an inhaled one.
- The amount of carbon monoxide in the blood of nonsmokers doubles in a poorly ventilated room filled with cigarette smoke. Even outside the room, the inhaled carbon monoxide stays in the body for three or four hours.
- Researchers have found that respiratory infections, especially pneumonia and acute bronchitis, are twice as common in young children whose parents smoke at home compared with those with non-smoking parents.

Tribute to Rosie the Riveter

Up until the 1940's, the menu of career options for a woman was limited: domestic, shop clerk, or waitress. But U.S. entry into World War II created an unprecedented demand for new workers, and the notion of what constituted proper work for women changed overnight.

Thousands of posters appeared calling on women to "do the job he left behind," and Rosie the Riveter was born — the national heroine whose participation in industry was essential to the country's survival.

When the war was over, Rosie wanted to stay; but the men were back and the definition of a

woman's role again had shrunk to encompass only family and home. But women had tasted the pride and dignity that can be a part of working, and they now wanted the freedom to pursue a career if they chose. In 1964, the equal opportunity amendment passed. In precedent, women now had that freedom. In reality, young women stepping beyond expected

roles were still faced with a significant challenge. Those who did, however, deserve recognition for helping today's young women pursue careers with regard to interests and talents, not social expectations.

Change is positive

Over the past two decades, the number of women pursuing careers in science, mathematics, and engineering — areas once virtually reserved for men — has increased dramatically. Bob Walan, general manager of the Central Region at Cray Research, comments: "The high-tech computer industry experienced rapid growth at the same time women expanded the technical workforce. These parallel developments account, in part, for the computer industry's easy acceptance of women."

"At Cray Research," Bob continues, "we have a history of recruiting and retaining talented people — period. We do have a need, along with every other high-tech company, for more female engineers. But the need is proportional to the number of women in the technical population. Although the statistics are changing, there is still a greater number of men available with degrees and experience in technical fields."

According to the latest figures from the National Center for Education Statistics, 34 percent of the bachelor's degrees awarded in the U.S. in computer science and 43 percent of the bachelor's degrees in math went to women. At the same time, eight percent of the electrical engineering degrees were awarded to women. At Cray Research, 20 percent of our programmers and analysts, and almost seven percent of our engineers, are women — an impressive statistic when looking at the percentage of technical degrees women receive.



Cover from the *Saturday Evening Post*, September 4, 1943: "Rosie to the Rescue."

"Females compose more than half of the human population," explains Sue Garcia, logic design engineer working on the CRAY-2 project in Chippewa Falls. "Yet they are still a small percentage of the available workforce. In general, high technology needs more women. In specific, Cray Research is doing an excellent job of recruiting and retaining qualified women in technical positions."

Cray's example

Just as a sibling will follow the example of a brother or sister, Cray Research is often observed by other members of the industry. "Because this company is a significant and successful member of the computer industry," explains software development's Peggy Boike, "our actions have a strong effect on other companies. When we express confidence in the performance of women, we are setting a socially significant example for companies to follow."

The high quality that Cray Research demands from its people extends far beyond initial recruiting. As Margaret Loftus, vice president of software, comments, "At this company, getting hired or receiving a promotion is not a matter of gender — it's a matter of competence. The consequences of your career rely on the effectiveness of your performance. We demand the best, and if that is what you give, your career will reflect success."

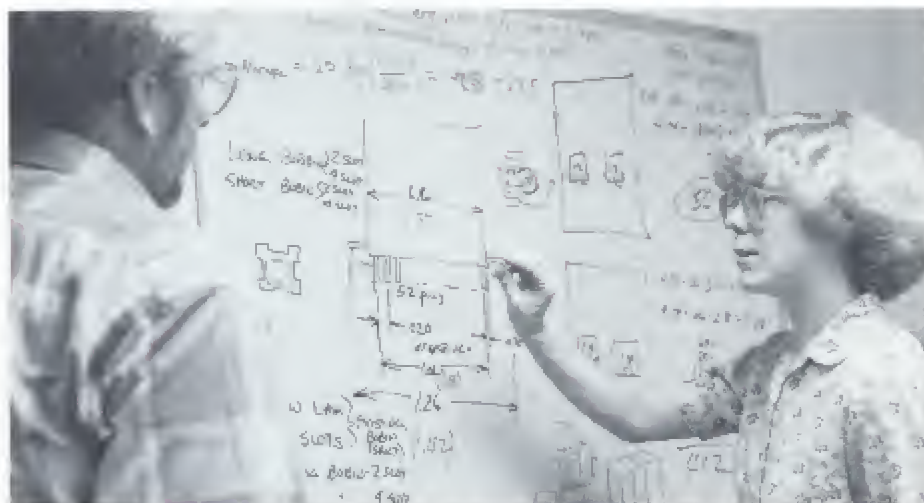
A company that rewards excellence provides the platform for productivity, motivation, encouragement, and support. Kathy Eudy, the first woman engineer-in-charge at Cray Research, agrees with this philosophy. "I have a position with a great deal of responsibility," she explains, "and along with it, I have the confidence of my managers and associates that I can do my job

well. This support is reflected in my work — I work hard for myself and my colleagues."

Kathy's experience working in a male-dominated field goes back to her days in the Navy. "I spent six years in the service," she remembers. "During that time, I learned that there are many people with principles different from my own. However, I also learned that arguing with these people is a waste of personal and professional energy. The best working conditions are those in which men and women have mutual respect for each other's capabilities. The result is cooperation between peers and

commitment to the company."

The influx of working women in the 1940s was based entirely on need. Today, it is a combination of need and equal opportunity. The number of working women contributing their time and talents is increasing every year. Although many companies still have not accepted a common attitude towards men and women, at Cray Research the focus is on performance. Being accepted for your abilities takes a lot of individual effort, but that is the credence of the Cray Style: it is the *individuals* who are the real strength of Cray Research.



Cray has a history of hiring and retaining talented people. Twenty percent of our programmers and analysts, and nearly seven percent of our engineers are women. Above: Sue Garcia, Chippewa Falls.



According to Kathy Eudy, Cray's first woman engineer-in-charge, the environment at Cray Research is one in which men and women have mutual trust and respect of each other's capabilities.

News Briefs

First CRAY-2 in UK to be installed at Harwell Laboratory

On April 28, Cray Research announced that a CRAY-2 supercomputer valued at approximately \$20 million has been ordered by the United Kingdom Atomic Energy Authority (UKAEA). The system will be purchased and will be installed at the Harwell Laboratory in Oxfordshire, England during the third quarter of 1987. The CRAY-1/S supercomputer now installed at Harwell will be replaced early in the third quarter of 1986 by a CRAY X-MP/24 computer on lease interim to the CRAY-2 system.

The Harwell Laboratory is the largest establishment within the UKAEA, and is a multi-disciplinary organization engaged in a broad range of contract research for government and industry. The Laboratory provides computing services to the UKAEA and to the Joint European Fusion Laboratory located in Culham, England.

John Rollwagen said, "This order is a major event for Cray, representing the first CRAY-2 order in the United Kingdom. It is especially gratifying that this order is from one of our earliest CRAY-1 customers."

McDonnell Douglas Corporation orders CRAY X-MP supercomputer

On May 15, Cray Research announced that McDonnell Douglas has ordered a CRAY X-MP/14 supercomputer and a 32-million-word Solid-state Storage Device valued at approximately \$9 million. The system, which will be purchased,

will be installed in the second quarter of 1986 at the company's facility in St. Louis, Missouri.

McDonnell Douglas will use the supercomputer to support the activities of several of the corporation's divisional companies in the design and production of aerospace products.

McDonnell Douglas Corporation is a leader in the development and application of aerospace technology. Major product lines are combat aircraft, transportation aircraft, space systems and missiles, and information systems. The corporation also is active in commercial, financial, leasing, and energy systems.

It's open house season

Chippewa Falls

An open house will be held on June 7th and 8th at Cray Research's Riverside Industrial Park in Chippewa Falls. On the 7th, all buildings except for the Printed Circuit Board Facility (PCB) will be open to Cray people and their families. With the exception of PCB and Advanced Research, the public is invited to visit Cray Research on the following day, June 8th. The buildings will be open from 11 a.m. to 4 p.m. both days, and everyone is invited to join in the fun. Self-guided tours will begin at the Riverside Project Building and end at the Harry Runkel Engineering Building. Refreshments will be served at the end of the tour.

Mendota Heights

A technical recruiting open house will be held on June 24th and 25th in the 1440 building in Mendota Heights. In previous years, this has been a very successful recruiting event. As in the past, this year's open house

will be a joint effort with Chippewa Falls and other locations. For more information, contact Dorothy Olson (ext. 3635) or Sandy Slette (ext. 3164) in Mendota Heights.

Congratulations are in order

In March, Cray Research announced the appointments of Dieter Schneider as Managing Director of Cray GmbH in West Germany, and Martin Buchanan as Managing Director of Cray Canada Inc. The excellent experience that Dieter and Martin have with Cray Research, coupled with their management and leadership abilities, make them ideal choices to lead our operations — congratulations to both Dieter and Martin on their new assignment.

First quarter financial results

On April 22, Cray Research reported revenue of \$142,021,000 and net earnings of \$30,882,000, equal to \$1.00 per share, for the first quarter ended March 31. This compares with revenue of \$118,664,000 and net earnings of \$30,839,000, or \$1.02 per share, in the first quarter of 1985.

During the first quarter, the company installed nine new computer systems, including four CRAY X-MP/48 systems and one CRAY-2 system. Eleven orders were obtained during the quarter; and the majority of the orders were for the company's high-end systems: five CRAY X-MP/48 and two CRAY-2 systems.

Six of the new systems installed were purchased and three leased. This compares with nine installations in the first quarter of 1985, all of which

were purchased. The company's financial results are influenced significantly by the number of computer systems accepted during the period and by whether systems are purchased or leased.

John Rollwagen said the company is off to a strong start for 1986. He added: "We are on track with our installation schedule and feel confident about our ability to meet the continued strong demand for our systems."

Correction: The April issue of *Interface* incorrectly stated that the way to measure your heart rate while exercising was to count the number of pulse beats you have in 15 seconds, and to multiply that number by six. Actually, you should multiply the number of pulse beats by four to get a measure of your heart rate per minute. Thanks to Jim Rederer of Mendota Heights for pointing out this error.

CRAY RESEARCH, INC. AND SUBSIDIARIES

Consolidated Summary of Earnings (Unaudited)

(In thousands, except per-share data)

	Three months ended March 31	
	1986	1985
Revenue	\$ 142,021	\$ 118,664
Operating costs and expenses	87,008	65,681
Operating income	55,013	52,983
Other income	1,976	1,121
Earnings before income taxes	56,989	54,104
Provision for income taxes	(26,107)	(23,265)
Net earnings	\$ 30,882	\$ 30,839
Earnings per common and common equivalent share	\$ 1.00	\$ 1.02
Average number of common and common equivalent shares outstanding	31,315	30,085

Livio DeSimone enriches our style

As the newest member of Cray's board of directors, Livio DeSimone has many attributes that fit the Cray environment. People describe him as technically sound, trusted, respected, and fun. He also adds a new perspective to Cray Research — a perspective stemming from his impressive 30-year career with Minnesota Mining and Manufacturing, also known as 3M. Livio's ability to take on new challenges and find opportunities paved a path leading to his appointment as Executive Vice President and board member of 3M, which is a \$7.8 billion company today.

Challenges

After graduating from McGill University in Montreal with a degree in chemical engineering, Livio joined 3M Canada as a process engineer. For several years he served in various domestic and international positions within 3M's industrial products line. First and foremost, he considers himself a chemical engineer. In this capacity, he understands the difficulties facing technical people today.

"I visit the labs at 3M regularly and see the tremendous challenge that technical people face in staying current throughout their life spans," he



Livio and Lise DeSimone

(continued)

says. "A strong educational background is a first premise for technical people. It's also important that companies provide an opportunity for people to continue their education."

Moving into new areas also helps technical people keep up with change, Livio says. "The key is people's ability and willingness to discover their aptitudes — to experiment and try new things. Many people don't stay in the fields that match their formal educations. An ability to move from an original discipline enables a person to stay for many years while continuing to be challenged within an organization."

According to Livio, a real challenge is moving from an expert technician to a managerial position. Training, modeling, and motivation are necessary for success. Livio's first general management experience came in 1971 when he was appointed Managing Director of 3M Brazil. He rose to the challenge, and this led to other positions within the company. In 1975 he served as General Manager of the Building Service and Cleaning Products Division, and in 1976 he was

appointed Area Vice President for Latin America. In 1979, he was named Vice President of the Abrasives, Adhesives, Building Service and Chemicals Group, and in 1981 he became Executive Vice President of 3M's Life Sciences Sector.

Opportunities

Fairness and opportunity are part of the 3M culture, and Livio shares the values of that culture. "People don't like to be blindsided by something outside of their control," he says. "That's why measuring by performance and accomplishment is something with which people tend to feel comfortable. When given the opportunity, the motivation, and a fair chance to prove their abilities, people rise to the occasion. To provide opportunities, a company must be successful —and to be successful, a company must grow."

3M is a highly successful company. When Livio joined 3M in 1957, the company's sales were \$370 million. Today 3M has revenues of \$7.8 billion and employs more than 85,000 people worldwide. Even at a large size,

3M continues to be an innovative and technically sound company.

And a balanced life

Livio DeSimone, known as Desi to many people, has contributed to 3M's reputation for innovation. He shares the credit with Lise, his wife of 29 years. Livio and Lise have four children. Their oldest son, Danny, is an electrical engineer. Their daughter Livia is a biochemist. Mark is graduating from the University of Minnesota as a mechanical engineer. And their youngest daughter, Cindy, is graduating from St. Paul Academy and plans to attend Southern Methodist University in Dallas.

Although work and family keeps them busy, Livio and Lise balance their life with traveling and golf, which are major recreational outlets for them. Their travels have taken them throughout the world. And given the opportunity and a good challenge, they should enjoy Cray's annual golf tournament in Chippewa Falls.

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Terms, terms, terms

Migration: Migration is the movement of customer applications from one operating system (COS, CTSS, etc.) to another (UNICOS). Since UNICOS is a portable operating system, the customer will not have to migrate again with future hardware upgrades. Transportability of software lends itself to upward migration. Tools

enabling migration are being developed to make this transition as easy as possible.

Transportability: The ability to move something (either hardware or software) from one machine to another with minimal modification. At Cray Research, the UNICOS operating system is considered transportable.